larger gonads than males with large energy rich eggs, whereas males have much smaller gonads that produce numerous relatively inexpensive sperm.

This study has focused on the ultimate explanations of the observed sexual dimorphism in *S. argus*, yet it would be interesting to further examine the proximate causes of these differences.

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## 15. MOTION CAMOUFLAGE AND SPINNING WHEELS

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Acharya (1961) and Worth (1962) noted the strange behaviour of dragonflies in relation to spinning bicycle wheels. Acharya (1961) noted that near a particular lake in Gujarat, up to 50 dragonflies of an undetermined species belonging to Anisoptera would fly parallel with the rear wheel of his bicycle, moving when he moved and stopping when he stopped. They would maintain their fixed position even in response to a burst of speed or sudden slowing.

Worth (1962) noted that South African dragonflies of the same suborder also maintained a constant position with respect to the spinning front wheel of his bicycle. He also mentioned that the dragonflies would keep pace with his feet when he walked along sunny trails.

I have on a few occasions had the same thing happen with the large dragonfly *Anax guttatus* (Burmeister) and the front wheel of my motorcycle, moving at 30 kmph in the Bhimtal valley in Uttarakhand. Once, one of these dragonflies accompanied me for about 200 m on a winding hill road. On another occasion I noticed the dragonfly by the flashing reflections of the evening sun off its wings, which looked very much like the light reflected from the spokes of spinning motorcycle or, indeed, bicycle wheels.

Both of the previous authors could not offer a satisfactory explanation. Acharya (1961) suggested that dragonflies are fun loving and constantly sport with each other. "Perhaps the habit of continuous movement may be responsible for the peculiar behaviour referred to above, being attracted by the moving wheels."

Worth (1962) suggested that dragonflies use hunting tactics similar to those used by Cattle Egrets, who attend large mammals in order to catch the insects disturbed and put to flight by these mammals.

Mizutani *et al.* (2003) throw more light on this matter. They suggest that dragonflies utilize motion camouflage as a means of catching highly manoeuvrable prey. In this, the dragonfly moves in such a way that it imitates the trajectory of a distant stationary object on the retina of its potential prey by maintaining a certain position in relation to the retina of the potential prey. This is achieved by precise flight control and positional sensing. That is if Acharya's and Worth's rear and front wheels respectively or my motorcycle's front wheel had retinas, they would have observed a stationary dragonfly while we, the riders, with a different trajectory, noticed and wondered about the moving dragonflies practising their inborn, so far unexplained, ability to appear motionless and, therefore, harmless, to the spinning wheels.

This, then, is a rather clever way of stalking prey. This

implies that the dragonflies considered the spinning wheels as something worth stalking or, at least, pursuing. In one of my experiences, the reflections from the transparent wings of the accompanying *Anax* dragonfly reminded me very much of a spinning wheel. Perhaps the flashes of light reflected from the spinning spokes resemble a dragonfly's wings' flashes on the retina of the stalking dragonfly.

In the case of the large, solitary *Anax* species, which are active even at dusk, this could be a preliminary means of mate recognition.

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# 16. ABUNDANCE AND DIVERSITY OF ODONATA (INSECTA) IN SOME HILLY REGIONS OF TAMIL NADU

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## Introduction

Fraser (1933, 1934, 1936) recorded 116 species of Odonata (Insecta) from the hilly regions of India. A perusal of literature (Miller 1992; Gunathilagaraj *et al.* 1999; Palot and Soniya 2000a,b; Asaithambi and Manickavasagam 2002; Emiliyamma and Radhakrishnan 2003; Kandibane *et al.* 2005; Sharma *et al.* 2007) showed that there has been no comprehensive study on the abundance and diversity of this group from the hilly regions of Tamil Nadu. Hence, the present study was conducted to assess the diversity and abundance of Odonata in five hilly regions of Salem district in Tamil Nadu.

## Methodology

Five hilly regions, namely Yercaud, Karunkaradu, Pallikaradu, Periakaradu and Poonaikundru were surveyed to assess the Odonata diversity and abundance. The place of sampling and coordinates of the hilly regions are given in Table 1. Collections were made once after the North-east monsoon (January to April, 2006), and only adults were collected with the aid of sweep net (35 cm dia. and 70 cm ht.). In Yercaud, collections were made from small streams, tributaries of Kiliyanur River and from boat house lake. Karunkaradu, Pallikaradu, Periakaradu and Poonaikundru were devoid of water bodies and collections were made with a sweep net by slowly walking around the hills. The identity of collected Odonata was fixed using the keys developed by Fraser (1933, 1934, 1936), Kumar and Prasad (1981), Ram *et al.* (1982), Barrion and Litsinger (1994), and Emiliyamma and Radhakrishnan (2000). Odonata diversity was computed using the Simpson's index (Simpson 1949).

$$\text{Simpson's index } (\lambda) = \sum_{i=1}^{s} ni\,(ni-1) / N\,(N-1)$$

Where, ni is the number of individuals of the $i^{th}$ species, and

N is the total number of individuals in the sample

Simpson's index ($\lambda$) varies from 0 to 1. Increase in the value of the index indicates decrease in the diversity of species and vice-versa.

**Abbreviations used**: dia. - diameter; ht. - height

**Table 1**: Coordinates of the hilly regions sampled in the present study

| Hill | District | Altitude (m) | Latitude | Longitude | Shade cover | Water bodies |
|---|---|---|---|---|---|---|
| Yercaud | Salem | 1,500 | 11° 48' N | 76° 13' E | High | Present |
| Karunkaradu | Bukkampatty, Salem | 220 | 11° 19' N | 77° 40' E | Low | Absent |
| Poonaikundru | Bukkampatty, Salem | 200 | 11° 19' N | 77° 40' E | Low | Absent |
| Pallikaradu | Bukkampatty, Salem | 200 | 11° 19' N | 77° 40' E | Low | Absent |
| Periakaradu | Bukkampatty, Salem | 250 | 11° 19' N | 77° 40' E | Low | Absent |